

CLAIMS

What is claimed is:

1. A method for dispersing a population of carbon nanotubes comprising:
 - 5 a) providing a stabilized solution of nucleic acid molecules;
 - b) contacting a population of carbon nanotubes with an effective amount of the stabilized nucleic acid solution of step (a) for a time sufficient to disperse the carbon nanotubes; and
 - 10 c) optionally recovering the dispersed carbon nanotubes.
2. A method according to claims 1 wherein the nucleic acid solution is aqueous.
3. A method according to Claim 1 wherein the contacting is done in the presence of an agitation means.
- 15 4. A method according to Claim 1 wherein the contacting is done in the presence of a denaturing agent.
5. A method according to Claim 1 wherein the contacting is done at about 4°C.
- 20 6. A method according to Claim 3 wherein the agitation means is selected from the group consisting of sonication, high shear mixing, or any combination thereof.
7. A method according to Claim 1 Wherein the nucleic acid molecules are selected from the group consisting of; single stranded DNA, double stranded DNA, RNA and PNA.
- 25 8. A method according to Claim 7 wherein the nucleic acid molecules are either synthetic or substantially isolated from nature.
9. A method according to Claim 7 wherein the nucleic acid molecule is selected from the group consisting of:
 1. An wherein n = 1 – 2000;
 - 30 2. Tn wherein n = 1 – 2000;
 3. Cn wherein n = 1 – 2000;
 4. Gn wherein n = 1 – 2000;
 5. Rn wherein n = 1-2000, and wherein R may be either A or G;
 - 35 6. Yn wherein n = 1 – 2000, and wherein Y may be either C or T;

7. Mn wherein n = 1 - 2000, and wherein M may be either A or C;
8. Kn wherein n = 1 - 2000, and wherein K may be either G or T;
9. Sn wherein n = 1 - 2000, and wherein S may be either C or G;
10. Wn wherein n = 1 - 2000, and wherein W may be either A or T;
11. Hn wherein n = 1 - 2000, and wherein H may be either A or C or T;
10. Bn wherein n = 1 - 2000, and wherein B may be either C or G or T;
13. Vn wherein n = 1 - 2000, and wherein V may be either A or C or G;
14. Dn wherein n = 1 - 2000, and wherein D may be either A or G or T; and
15. Nn wherein n = 1 - 2000, and wherein N may be either A or C or T or G;

10. A method according to Claim 1 wherein the nucleic acid molecules are from about 10 bases to about 1000 bases in length.

20. A method according to Claim 1 wherein the nucleic acid molecules are functionalized with a member of a binding pair.

12. A method according to Claim 11 wherein the member of a binding pair is one of the binding pairs selected from the group consisting of glutathione-S-transferase/glutathione, 6X histidine .Tag/Ni-NTA, streptavidin/biotin, S-protein/S-peptide, cutinase/phosphonate inhibitor, antigen/antibody, hapten/anti-hapten, folic acid/folate binding protein, and protein A or G/immunoglobulins.

30. A method according to Claim 11 wherein the binding pair is one of the binding pairs selected from the group consisting of biotin/streptavidin and biotin/avidin.

35. A method of immobilizing a carbon nanotube comprising:

- a) providing a stabilized solution of nucleic acid molecules, said nucleic acid molecules functionalized with at least one first member of a binding pair;
- b) providing a solid substrate having at least one second member of a binding pair immobilized thereon;

- c) contacting a population of carbon nanotubes with an effective amount of the stabilized nucleic acid solution of step (a) whereby the population of carbon nanotubes is dispersed and whereby each carbon nanotube of the population becomes associated with at least one functionalized nucleic acid molecule of step (a); and
- d) contacting the dispersed, nucleic acid associated carbon nanotubes of step (c) with the solid substrate of step (b) whereby the nucleic acid associated carbon nanotubes are immobilized through the interaction of the first and second binding pairs.

15. A method according to Claim 14 wherein the solid support is in a form selected from the group consisting of: a film, a bead; a semiconducting metallic surface, a wafer substrate, glass, and mica.

15 16. A method according to Claim 14 wherein the member of a
binding pair is derived from one of the binding pairs selected from the
group consisting of glutathione-S-transferase/glutathione, 6X histidine
Tag/Ni-NTA, streptavidin/biotin, S-protein/S-peptide,
cutinase/phosphonate inhibitor, antigen/antibody, haptens/anti-haptens, folic
acid/folate binding protein, and protein A or G/immunoglobulins.
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17. A method according to Claim 14 wherein the first member of binding pair is a negatively charged phosphate backbone of a nucleic acid molecule, and the second member is a positively charged surface.

18. A method according to Claim 14 wherein the nucleic acid
molecule is selected from the group consisting of single stranded DNA,
double stranded DNA, RNA and PNA.

19. A method according to Claim 14 wherein the functionalized nucleic acid molecule optionally comprises a hybridization domain.

30 20. A method according to Claim 19 wherein the functionalized nucleic acid molecule binds additional nucleic acid molecules by hybridization through the hybridization domain.

21. A carbon nanotube - nucleic acid complex comprising an unfunctionalized carbon nanotube bound to a nucleic acid molecule.

22. A carbon nanotube - nucleic acid complex according to
35 Claim 21 wherein nucleic acid is selected from the group consisting of;
single stranded DNA, double stranded DNA, RNA and PNA.

23. A carbon nanotube - nucleic acid complex according to
Claim 21 wherein the nucleic acid is either synthetic or substantially
isolated from nature.

24. A carbon nanotube - nucleic acid complex according to
5 Claim 21 wherein the nucleic acid is from about 10 bases to about 1000
bases in length.

25. A carbon nanotube - nucleic acid complex according to
Claim 21 wherein the nucleic acid is functionalized with a member of a
binding pair.

10 26. A carbon nanotube - nucleic acid complex according to
Claim 25 wherein the member of a binding pair is derived from one of the
binding pairs selected from the group consisting of glutathione-S-
transferase/glutathione, 6X histidine Tag/Ni-NTA, streptavidin/biotin, S-
protein/S-peptide, cutinase/phosphonate inhibitor, antigen/antibody,
15 hapten/anti-hapten, folic acid/folate binding protein, and protein A or
G/immunoglobulins.

27. A carbon nanotube - nucleic acid complex according to
Claim 21 wherein the nucleic acid is metallized.